

17.24.310 BLASTING PLAN

(1) The Operator plans on blasting both during facilities construction, and during underground operations. The operator will employ a Montana certified blaster or retain the services of a contract blaster that is certified in Montana for all blasting and will consult with DEQ prior to initiating blasting operations to obtain consent regarding the use of certified blasters.

(1)(a) Types and Approximate Amounts of Explosives to be Used for Each Type of Blasting Operation

Ammonium nitrate, fuel oil (ANFO) and emulsions in bag or bulk form are utilized in normal blasting operations. The amount of explosives used will vary due to geology, required post blast profile and/or method of extraction, i.e. loading equipment. The approximate average powder factors are anticipated to be 0.48 lb/cubic yard to 0.50 lb/cubic yard.

(1)(b)(i) Procedures Used for Drilling Patterns

Typically, patterns are designed to achieve maximum fragmentation from traditional powder factors. Design criteria for patterns starts with the anticipated average depth of material to be blasted. Burden and spacing are derived using traditional powder factors to achieve the desired outcome. Secondly, borehole diameter affects the design, which relates back to successful long-term powder factors.

These patterns are generally located in the field by a designed toe, which is transferred to the field. The pattern is then oriented from this predetermined line. These patterns can be drilled vertical or angled depending on the material and desired operational outcome.

In general, drill holes will be four (4) inches in diameter. The depths drilled for blasts range from 20 to 30 feet. The number of holes per blast varies widely depending upon the pattern size and location. Typical operations will utilize a 14' by 14' drill pattern, and 14' by 16' drill pattern when closer to the blast edge.

(1)(b)(ii) Procedures Used for Charging and Packing of Holes

ANFO in bulk form is normally used when water problems are not evident. ANFO/emulsion blends or bagged ANFO are used when water or damp conditions are present in the borehole. When bulk ANFO or ANFO/emulsion blend is used, a primer is placed on or near the bottom of each borehole, and then the desired amount of explosive product is augured into the hole. This method encases the primer in the blasting agent which insures good contact.

When bagged ANFO is utilized, the primer is placed on the bottom of each borehole and is then followed by one or two bags of blasting agent. A primer is placed between two bags of ANFO, or between each bag of ANFO, depending upon down-hole moisture conditions.

Packing (stemming) for boreholes is determined by the material being drilled and by environmental conditions. Cuttings are used as stemming when drilling in unfrozen and/or dry material.

(1)(b)(iii) Types of Fuses and Detonation Controls

Depending upon size of the pattern, millisecond delays used are, but not limited to, 9, 17, 25, 65, and/or 100 to reduce ground shock and airblast. Detonation controls are initiated with a shotgun shell primer or electronic shock tube starter. Non-electric initiating line of appropriate length is used to connect the initiator to the pattern. Occasionally, electric initiating equipment may be used to determine the effectiveness of new or alternative blasting techniques.

(1)(b)(iv) Procedures Used for Sequencing and Timing of Firing Holes

Sequencing is accomplished by placing delays between each row in the pattern. Down-hole delays will be used as required.

(1)(b)(v) Recording and Retaining Procedures for the Above

A record of each blast, including seismographic reports as required, will be retained for at least 3 years and made available for inspection by the DEQ and the public upon request. Blasting records will be complete and accurate at the time of inspection. All information pursuant to ARM 17.24.626 will be collected. Records contain data shown on the sample, "Record of Blasting Operations" as outlined in ARM 17.24.626. Pursuant to ARM 17.24.626(1)(k), the maximum pounds of explosives detonated within an eight millisecond delay period will be calculated by multiplying the maximum number of holes detonated within eight milliseconds by the pounds of explosives in the blast hole with the most pounds of explosives. More precise accounting of the pounds per eight milliseconds requirement will be used if exceeding the scaled distance factor becomes an issue and no seismic data is available. A copy of the Blasting Record form is included herewith as Exhibit 310-3.

(1)(c) Blast Warnings and Site Access Control Procedures

Warnings and all clear signals will be audible within a range of one-half mile from the point of blast. All persons within the permit area will be notified of the meaning of signals through appropriate instructions and signs posted on all entrances to the permit area. The Operator will use an electric siren/horn for warning and all clear signals. The warning signal used in blasting will be published in the blasting notice. In that event, The Operator will advise the DEQ of any changes, and make all other necessary notifications and publications.

Access to the blasting area will be regulated to protect the public and livestock from effects of blasting. Unauthorized re-entry to the blasting area will be forbidden until The Operator's authorized representative has determined no hazards exist and travel through the area can safely resume. Areas which contain charged holes will be guarded, barricaded and posted, or flagged against unauthorized entry.

(1)(d) Description of Blast Monitoring Equipment

Except as allowed by the DEQ, maximum peak particle velocity of ground motion in any direction will not exceed the allowable limits on the DEQ scaled distance table at the immediate location of any dwelling, public building, school, church, or commercial or institutional building. Peak particle velocities will be recorded in 3 mutually perpendicular directions. Maximum peak particle velocity is the largest of 3 measurements. The DEQ may reduce maximum peak particle velocity allowed if it determines that a lower standard is required because of population density or land use, age or type of structure in the area, geology or hydrology of the area, frequency of blasts or other factors. Maximum peak particle velocity of ground motion does not apply to property inside the permit area that is Company owned or leased to another party.

Blasting is conducted in such a manner as to avoid adverse impacts and changes in the course, channel or availability of ground or surface water outside the permit area.

In addition, The Operator may use an equation for determining maximum weight of explosives that may be detonated within any 8 millisecond period, and if blasting is conducted in accordance with the equation, the DEQ will consider vibrations to be within the allowable peak particle velocity limit. In determining maximum allowable weight of explosives to be detonated within any 8 millisecond period, The Operator will use the following equation:

$$W = (D/D_s)^2$$

Where: W = Maximum weight of explosives (in pounds) per 8 millisecond period

D = Distance in feet to the nearest dwelling not owned by the operator

Ds = Scaled distance factor

Ds is determined from the following chart based on the distance to the nearest uncontrolled dwelling. The chart is from DEQ Administrative Rules of Montana 17.24.624(11):

DISTANCE (D) FROM THE BLASTING SITE, SITE IN FEET	MAXIMUM ALLOWABLE PEAK PARTICLE VELOCITY (V MAX) FOR GROUND VIBRATION IN INCHES/SECONDS	SCALED-DISTANCE FACTOR TO BE APPLIED WITHOUT SEISMIC MONITORING (Ds)
0 to 300	1.25	50
301 to 5,000	1.00	55
5,001 and Beyond	0.75	65

Where a seismograph is used to monitor velocity of ground motion, and the maximum allowable peak particle velocity limit is not exceeded, the scaled distance equation need not be used. If the equation is not used, however, a seismographic record of each blast must be kept. The Operator recognizes the DEQ may require a seismographic recording of any or all blasts.

The Operator recognizes the DEQ may approve use of a modified equation to determine maximum weight of explosives per delay at this particular mine site if requested by the operator.

The Operator recognizes the DEQ may approve use of ground vibration limits as an alternative to paragraphs (1) and (2) if requested by the operator.

(1)(e) Pre-blasting Survey Recording and Reporting Plan

Resident Request of a Pre-blasting Survey: The Operator will advise, in writing and in-person, all residents or owners of dwellings or other structures within one-half mile of the permit area how to request a pre-blasting survey. Verification of the advisement will be provided to the DEQ. Exhibit 310-1 is an example of a legal notice that will be published in the Roundup Record Tribune newspaper prior to blasting operations. Exhibit 310-2 is an example of a Pre-Blast Survey Request Notification that will be sent to owners of dwellings or other structures within on-half mile of the blast area.

Field Survey of Dwellings or Structures: Any resident or owner of a man-made dwelling or structure located within one-half mile of the permit area may submit to the DEQ a request for a pre-blasting survey or request the survey directly from the company representative. The Operator will then conduct a survey of the dwelling or structure, and submit the results to the DEQ.

Pre-blasting Survey Assessment Report: A written report of the survey will be prepared and signed by the person who conducted the survey. Recommendations regarding special conditions

or proposed adjustments to blasting procedures will be included. Copies of the report will be provided to the person requesting the survey and to the DEQ.

(1)(f) Unavoidable Hazardous Conditions Resulting in Deviations From the Blasting Schedule

Blasting will not be conducted at times different from those announced in the blasting schedule except in emergency situations where rain, lightning, or other atmospheric conditions, or operator or public safety, requires unscheduled detonation. In addition to required warning signals, oral notices will be provided to persons within one-half mile of the blasting site.

A complete written report of blasting at night will be filed with the DEQ not later than 3 days after night blasting. The report will include reasons for the delay, including why the blast could not be held over to the next day, when the blast actually was conducted, warning notices given and a copy of the blast record.

(1)(g) Structures to be Protected and Design Factors to Meet Applicable Airblast, Flyrock and Ground Vibration Standards

Air-blast will be controlled so that it will not exceed the values as specified in Section 17.24.624(6)(a) at any dwelling, public building, school, church, or commercial, public, or institutional structure, unless the structure is owned by permittee and is not leased to any other person. Periodic monitoring to ensure compliance with air-blast standards will be conducted.

Efforts will be made to minimize off-site damage from blasting concussions or vibrations. Except where lesser distances are approved by the DEQ, blasting will not be conducted within:

- (A) 1000 feet of any building used as a dwelling
- (B) 500 feet of facilities
- (C) 500 feet of underground mine

If so ordered by the DEQ, a blast design plan will be submitted to protect the above facilities. The plan will contain information required in this rule and will be signed by a certified blaster.

Fly-rock will not be cast from the blasting vicinity more than half the distance to the nearest dwelling or other occupied structure, and in no case beyond the property line owned or leased by The Operator.

Blasting activities will be carefully planned and supervised to prevent injury to persons, damage to public or private property outside the permit area, adverse effects on any underground mine, and change in the course, channel, or availability of ground or surface waters outside the permit area.

The Operator commits to complying with Rules 17.24.621 thru 17.24.626.